REMARKS

The Examiner's attention is directed to co-pending U.S. Patent Application Serial No. 10/860,290 that contains similar subject matter.

In sections 1 and 2 of the Office Action, the Examiner objected to the Abstract. Accordingly, the Abstract has been amended.

In sections 3-5 of the Office Action, the Examiner rejected claim 21 under 35 U.S.C. §103(a) as being unpatentable over Choi in view of Javerbring and further in view of Bingham.

Choi describes a system that performs block coding 10 and spreading 20 of data to be transferred from a transmitter to a receiver 50. The receiver 50 has matched filters 210 and 220, input buffers 310 and 320, adaptive multipath filters 410, 420, 430, and 440, error generators 510, 520, 530, and 540, a coupler 600, a data determiner 700, and a reference signal selector 800.

The matched filters 210 and 220 perform matched filtering of the received signals. The buffers 310 and 320 generate vectors corresponding to the signal blocks provided by the matched filters 210 and 220. The

adaptive multipath filters 410, 420, 430, and 440 filter the vectors from the input buffers 310 and 320 according to tap weights w_{ml1}, w_{ml2}, where l designates a corresponding multipath component and m designates a corresponding receiver antenna. The number of the adaptive multipath filters 410, 420, 430, and 440 is LxM, where L is the number of the multipath components and M is the number of the receiver antennas 40. The coupler 600 combines the signals from the adaptive multipath filters 410, 420, 430, and 440. The data determiner 700 restores the output signal from the coupler 600 to the original signal that is intended to be transferred by a specific user. The reference signal selector 800 selectively outputs either the output signal of the data determiner 700 or a known training data signal to the error generators 510, 520, 530, and 540.

The error generators 510, 520, 530, and 540 use the output signals from the reference signal selector 800 and from the adaptive multipath filters 410, 420, 430, and 440 in order to generate error signals for regulating the tap weights w_{ml1}, w_{ml2} of the adaptive multipath filters 410, 420, 430, and 440.

The inner product between the tap weights w_{ml1}, w_{ml2} and the spreading code vector c_1 of the

corresponding multipath component is constrained to "1" (this constraint is designated in Choi as g_1), and the inner product between the tap weights w_{m11}, w_{m12} and the spreading code vector c_i of another multipath component is constrained to "0" (this constraint is designated in Choi as g_2). These constraints g_1 and g_2 minimize the Constrained Minimum Mean Square Error cost product.

Minimizing the error produced by the error generators 510, 520, 530, and 540 eliminates the inter-path interference caused by the user's other multipaths as well as Multiple Access Interference, and determines an unbiased channel estimate even by a simple mean channel estimation method using the output of the adaptive multipath filters 410, 420, 430, and 440, thereby increasing reception performance.

The optimal tap weights w_{m11} and w_{m12} of the adaptive multipath filters 410, 420, 430, and 440 that minimize a given constraint cost function can be calculated by the Lagrangian multiplier method in which the optimal tap weights w_{m11} and w_{m12} are determined on the basis of a product between the constraints g_1 and g_2, the spreading code, and a term dependent on channel response and the spreading code.

Independent claim 21 - As can be seen from the above description of Choi, Choi fails to teach estimating an error at the output of an equalizer, determining a constraint value M as a function of the estimated error, and determining constrained tap weights for the equalizer based on a channel impulse response and a tap weight constraint function having the constraint value M.

The Examiner asserts that Choi discloses determining a constraint value M as a function of the estimated error. However, Choi does not. Choi does disclose the use of constraints g_1 and g_2. However, these constraints are not determined as a function of the estimated error. Instead, the constraints g_1 and g_2 are fixed values.

Likewise, Javerbring and Bingham fail to teach estimating an error at the output of an equalizer, determining a constraint value M as a function of the estimated error, and determining constrained tap weights for the equalizer based on a channel impulse response and a tap weight constraint function having the constraint value M.

Javerbring does not mention constraining tap weights at all.

Bingham describes constraining the taps weights of an equalizer in accordance with the symmetry of the differential delay characteristic of the transmission medium around a signal carrier frequency. However, Bingham does not disclose determining a constraint value as a function of the estimated error at the output of an equalizer, and determining constrained tap weights for the equalizer based on a channel impulse response and a tap weight constraint function having the constraint value M.

Accordingly, even if Choi, Javerbring, and Bingham could be combined, their combination would not teach the invention of independent claim 21 to one of ordinary skill in the art because none of these references teach the tap weight constraint function recited in independent claim 21.

Therefore, independent claim 21 is not unpatentable over Choi in view of Javerbring and further in view of Bingham.

In section 6 of the Office Action, the Examiner rejected claim 29 under 35 U.S.C. §103(a) as being unpatentable over Choi in view of Javerbring and further in view of Bingham and still further in view of Gozzo.

However, Gozzo also fails to teach estimating an error at the output of an equalizer, determining a constraint value M as a function of the estimated error, and determining constrained tap weights for the equalizer based on a channel impulse response and a tap weight constraint function having the constraint value M.

Indeed, Gozzo fails to mention constraining tap weights at all.

Accordingly, even if Choi, Javerbring, Bingham, and Gozzo could be combined, their combination would not teach the invention of independent claim 21 to one of ordinary skill in the art because none of these references teach the tap weight constraint function recited in independent claim 21.

Therefore, independent claim 21 is not unpatentable over Choi in view of Javerbring and further in view of Bingham and still further in view of Gozzo.

Because independent claim 21 is not unpatentable over Choi in view of Javerbring and further in view of Bingham and still further in view of Gozzo, dependent claim 29 likewise is not unpatentable over Choi in view of Javerbring and further in view of Bingham and still further in view of Gozzo.

CONCLUSION

In view of the above, it is clear that the claims of the present application are patentable over the references applied by the Examiner. Accordingly, allowance of these claims and issuance of the above captioned patent application are respectfully requested.

Respectfully submitted,

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